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EXAMINER

NADAV, ORI

ART UNIT PAPER NUMBER

2811

DATE MAILED: 06/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/998,420

Applicant(s)

AHMAD ET AL.

Examiner

ori nadav

Art Unit

2811

**The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 November 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 99-115 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 99-115 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.                      6) ☐ Other:

Art Unit: 2811

## **DETAILED ACTION**

### ***Oath/Declaration***

1. The oath/declaration filed on 11/29/2001 is acceptable.

### ***Drawings***

2. The formal drawings filed on 11/29/2001 are acceptable.

### ***Information Disclosure Statement***

3. The Information Disclosure Statement filed on has been considered.

### ***Specification***

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
5. The abstract of the disclosure is objected to because the abstract should be brief, no longer than 150 words. Correction is required. See MPEP § 608.01(b).
6. The disclosure is objected to because of the following informalities: On page 1, line 3, please insert "09/167,174". On page 1, line 6, please insert "6,333,539".  
Appropriate correction is required.

Art Unit: 2811

***Claim Objections***

7. Claims 99-115 are objected to because of the following informalities:
8. Claims 99 and 112 recite the limitation "the first and second gap regions" in lines 13, respectively. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests to replace the phrase "first and second gaps" in lines 12, respectively, with the phrase "first and second gap regions".
9. Claim 99 recites the limitation "the respective" in lines 11-12 and 13. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests to delete the term "the".
10. Claim 105 recites the limitation "the respective" in lines 5, 10 and 12. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests to delete the term "the".
11. Claim 105 recites the limitation "the first and second segments" in line 13. There is insufficient antecedent basis for this limitation in the claim.
12. Claim 105 recites the limitation "the first and second source/drain regions" in lines 13-14. There is insufficient antecedent basis for this limitation in the claim.
13. Claim 106 recites the limitation "the first and second halo regions" in line 1. There is insufficient antecedent basis for this limitation in the claim.
14. Claim 107 recites the limitation "the first and second halo regions" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Art Unit: 2811

15. Claim 107 recites the limitation "the respective" in line 2. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests to delete the term "the".

16. Claim 108 recites the limitation "the respective" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests to delete the term "the".

17. Claim 109 recites the limitation "the respective" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests to delete the term "the".

18. Claim 112 recites the limitation "the first and second sidewalls" in line 5. There is insufficient antecedent basis for this limitation in the claim.

19. Claim 112 recites the limitation "the first and second oxide layers" in line 9. There is insufficient antecedent basis for this limitation in the claim.

20. Claim 112 recites the limitation "the first and second sidewall spacers" in line 10. There is insufficient antecedent basis for this limitation in the claim.

21. Claim 112 recites the limitation "the respective" in lines 12 and 13-14. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests to delete the term "the".

22. Claim 112 recites the limitation "the first and second gap regions" in line 13. There is insufficient antecedent basis for this limitation in the claim.

Art Unit: 2811

Appropriate correction is required.

### ***Double Patenting***

23. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Art Unit: 2811

24. Claims 99-115 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 of U.S. Patent No. 6,333,539. Although the conflicting claims are not identical, they are not patentably distinct from each other, because claims 99-115 are generic to claims 1-5 of U.S. Patent No. 6,333,539 as claims 99-115 are broader than claims 1-5 of U.S. Patent No. 6,333,539 and all the limitations of claims 99-115 are recited in claims 1-5 of U.S. Patent No. 6,333,539, thus providing applicant unjustified or improper timewise extension of the "right to exclude" granted by a U.S. Patent No. 6,333,539.

Regarding claims 99, 101, 105, 107 and 112, claim 1 of U.S. Patent No. 6,333,539 recites the limitations of a semiconductor transistor structure comprising: a region of a semiconductor wafer; a gate over the region, the gate having first and second opposing sidewalls; first conductivity type heavily doped first and second opposing source/drain regions proximate the first and second sidewalls, respectively; first and second opposing oxide layers extending along and at least partially covering the first and second sidewalls, respectively; first and second sidewall opposing spacers extending along and at least partially covering the first and second oxide layers, respectively, the entirety of the semiconductor wafer under the first and second sidewall spacers being defined as first and second segments, respectively, and the first and second segments being separated from the respective first and second source/drain regions by

Art Unit: 2811

respective first and second gaps, no part of the first and second gap regions being under the respective first and second sidewall spacers; and second conductivity type halo regions within the first and second gap regions and not extending into the first and second segments, wherein one of the first and second conductivity types is n-type and the other is p-type.

Regarding claims 100 and 113, claim 1 of U.S. Patent No. 6,333,539 recites the limitations of first and second sidewall spacers comprise silicon nitride (column 19, line 24).

Regarding claims 102, 106 and 114, claim 1 of U.S. Patent No. 6,333,539 recites the limitations of halo regions extend directly under a full lateral extent of the first and second source/drain regions (column 19, lines 45-47).

Regarding claim 103, claim 1 of U.S. Patent No. 6,333,539 recites the limitations of first and second sidewalls are opposing sidewalls (column 19, line 7)

Regarding claims 104 and 115, claim 1 of U.S. Patent No. 6,333,539 recites the limitations of first and second gap regions are not under any sidewall spacer (column 19, lines 41-43).



Art Unit: 2811

Regarding claim 108, claim 2 of U.S. Patent No. 6,333,539 recites the limitations of first and second oxide layers extending laterally out from the respective first and second sidewalls, directly under the respective first and second sidewall spacers, and directly over the respective first and second segments.

Regarding claim 109, claim 3 of U.S. Patent No. 6,333,539 recites the limitations of first and second oxide layers further extend past the respective first and second sidewall spacers, directly over the respective first and second gap regions, and directly over at least a portion of the respective first and second source/drain regions.

Regarding claim 110, claim 4 of U.S. Patent No. 6,333,539 recites the limitations of first and second oxide layers further extend past the respective first and second sidewall spacers, directly over the respective first and second gap regions, and directly over at least a portion of the respective first and second source/drain regions.

Regarding claim 111, claim 5 of U.S. Patent No. 6,333,539 recites the limitations of first and second gap regions are not under any sidewall spacer.

Art Unit: 2811

***Claim Rejections - 35 USC § 103***

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

26. Claims 105, 106, 108-109 and 111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (5,274,261) in view of Jain (4,949,136).

Regarding claim 105, Chen teaches in figure 10 and related text (column 3, line 64 to column 4, line 57) a semiconductor transistor device 10' comprising: a transistor gate 24' over a semiconductor material wafer (substrate), the transistor gate having opposing first and second sidewalls; first conductivity type, heavily doped, first and second opposing source/drain regions (the heavily doped regions which are formed in figure 10 below the LDD regions depicted in figure 9, column 4, lines 32-35) within the semiconductor material wafer beside the respective first and second sidewalls; first and second opposing oxide layers 28' (column 3, line 65) extending along and covering the respective first and second sidewalls; first and second opposing sidewall spacers 40' extending along and at least partially covering the respective first and second oxide layers 28'; first and second opposing segments consisting of an entirety of the semiconductor wafer material under the respective first and second sidewall spacers 40', the first and second segments being separated from the first and second

Art Unit: 2811

source/drain regions by respective first and second gap regions of the semiconductor material wafer; wherein one of the first and second conductivity types being n-type and the other of the first and second conductivity types being p-type.

Chen does not teach a second conductivity type first and second opposing halo regions within the respective first and second gap regions.

Jain teaches in figure 2 a second conductivity type first and second opposing halo regions 36 within the respective first and second gap regions.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a second conductivity type first and second opposing halo regions within the respective first and second gap regions, as taught by Jain, in Chen's device in order to improve the performance of the transistor by improving the punch through voltage and reducing the short channel effects.

Regarding claim 106, Chen does not teach first and second halo regions extending directly under a full lateral extent of the respective first and second source/drain regions. Jain teaches in figure 2 first and second halo regions extending directly under a full lateral extent of the respective first and second source/drain regions.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to extend the first and second halo regions directly under a full lateral extent of the respective first and second source/drain regions, as taught by Jain,

Art Unit: 2811

in Chen's device in order to further improve the performance of the transistor by improving the punch through voltage and reducing the short channel effects.

Regarding claim 108, Chen teaches in figure 10 first and second oxide layers 28' extend laterally out from the respective first and second sidewalls, directly under the respective first and second sidewall spacers 40', and directly over the respective first and second segments.

Regarding claim 109, Chen teaches in figure 10 first and second oxide layers 28' further extend past the respective first and second sidewall spacers 40', directly over the respective first and second gap regions, and directly over at least a portion of the respective first and second source/drain regions.

Regarding claim 111, Chen teaches in figure 10 first and second gap regions are not under any sidewall spacer.

27. Claim 110 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen and Jain, as applied to independent claim 105 and dependent claims 108-109 above, and further in view of Chiu et al. (4,843,023).

Art Unit: 2811

Regarding claim 110, Chen and Jain teach substantially the entire claimed structure, as applied to independent claim 105 and dependent claims 108-109 above, except first and second oxide layers further extend to a full lateral extent of the first and second source/drain regions.

Chiu et al. teach in figure 1L and related text (column 2, line 31 to column 3, line 39) first and second oxide layers 6 (see figure 1B and column 2, lines 39-41) extend to a full lateral extent of the first and second source/drain regions 22 (column 2, line 65).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to extend the first and second oxide layers to a full lateral extent of the first and second source/drain regions, as taught by Chiu et al., in Chen and Jain's device in order to reduce the processing steps of making the device. The combination is motivated by the teachings of Chiu et al. who point out the advantages of using oxide layers extending to a full lateral extent of the source/drain regions (see abstract).

***Allowable Subject Matter***

28. Claims 99-104 and 112-115 would be allowable if terminal disclaimer is timely filed in compliance with 37 CFR 1.321(c) to overcome an actual or provisional rejection based on a nonstatutory double patenting, set forth in this Office action.

Art Unit: 2811

29. Claim 107 would be allowable if rewritten in independent form to include all of the limitations of base claim 105, and if terminal disclaimer is timely filed in compliance with 37 CFR 1.321(c) to overcome an actual or provisional rejection based on a nonstatutory double patenting, set forth in this Office action.

***Reasons for allowance***

30. The following is an examiner's statement of reasons for allowance:

Chen and Jain appear to be the closest prior art references. Chen and Jain teach substantially the entire claimed structure, except second conductivity type halo regions not extending into the first and second segments, as recited in claims 99,107 and 112. Therefore, prior art do not teach or render obviousness the semiconductor structure, as claimed.

***Conclusion***

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference D is cited as being related to a MOSFET having a halo region not extending into first and second segments.

Air Unit: 2811

**Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.**

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(703) 308-8138**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached at **(703) 308-2772**.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

A handwritten signature in black ink, appearing to read 'Ori Nadav', is written over the printed name.

Ori Nadav

June 26, 2002